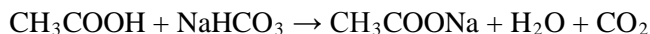


The Chemical Reaction Between Vinegar and Baking Soda

You may know that mixing vinegar and baking soda makes a lot of bubbles. This is because carbon dioxide (CO₂) is produced according to the following reaction:



The first chemical on the left is acetic acid (vinegar is about 5% acetic acid and 95% water), and the second chemical on the left is sodium bicarbonate (baking soda). You can see that in this reaction, the sodium atom (Na) replaces the hydrogen atom (H) in the first molecule. This produces sodium acetate (the first chemical on the right), water and CO₂.

(1) Find the molar masses of each one of the chemicals and enter them into the table.

	Molar Mass
CH ₃ COOH	
NaHCO ₃	
CH ₃ COONa	
H ₂ O	
CO ₂	

(2) What is the mass of 0.1 mole of baking soda?

(3) What is the mass of 0.1 mole of acetic acid?

(4) Use the triple beam balance to measure out 0.1 mole of baking soda into a beaker. Do this by first placing a 100 ml beaker on the balance and balancing it. Then set the scale to read the mass of beaker plus 0.1 mole of baking soda. Finally slowly scoop baking soda into the beaker with a knife until the scale balances.

(5) Look on the vinegar bottle to find the percent concentration of the acetic acid and write it here.

(6) Determine how much vinegar would contain 0.1 mole of acetic acid.

(7) Using a 400ml beaker, measure out the vinegar in the same way that you measured the baking soda. But measure about 25% extra (the instructor will tell you the purpose of the extra vinegar).

(8) Place both the beaker of baking soda and the beaker of vinegar on the balance and balance it. Record this reading.

(9) Pick up the baking soda beaker and using the knife, add little mounds of baking soda to the vinegar. Let the foam rise about halfway to the rim as you go. If you let it rise too far, water could spill or splash out, ruining your measurement of mass.

(10) When all the baking soda is gone, put the empty 100ml beaker back on the balance and let the setup sit for about 15 minutes.

(11) Rebalance the balance and record the mass here.

(12) How much mass left the setup during the reaction?

(13) We'll assume that this mass difference is due to the produced CO₂ leaving the beaker. How many moles of CO₂ is this?